TENORM IN THE DOWNSTREAM OIL SECTOR

RIZZIO E. Enrico.rizzio@eni.com [1], COLOMBO G. g.colombo@eni.com [1], DEVECCHI F. [1], FRESCA FANTONI R.[1]
DI CAPRIO E. [2], ERBANI S. [2], MACRI' S. [2]

[1] Eni S.p.A. Div. Exploration & production, via Emilia 1 – 20097 San Donato M.se. Italy
[2] Eni S.p.A. Div. Refining & Marketing, via Laurentina 449 – 00142 Rome. Italy

The accumulation of Naturally Occurring Radioactive Materials, in form of residuals or waste, has been a well-known phenomenon in the upstream oil sector for a long time. The great quantities of production water that enter the production plants together with crude oil and gas may transport natural radionuclides from the reservoir to the surface and favour their deposition inside processing equipment and vessels.
The presence of TENORM constitutes a significant radiological hazard for the human health, because it may generate exposures up to such levels that require to be constantly monitored during both routine and maintenance activities.
In the downstream oil sector, the volume of production water that enters the refineries together with the crude is very small (1-2 % of total product maximum), nevertheless in certain points of the production line it has been observed a deposition of TENORM; the presence of these materials may represent a potential hazard for the workers involved in maintenance activities, because it can expose them both to external irradiation and to internal contamination.
The objective of this paper is to present a project for managing the TENORM phenomenon in a refinery plant. The project provides:

- A propaedeutic information/formation of the workers
- the determination of the characteristic "hot spots", i.e. the typical places in which the deposition of NORM in refineries is favoured due to industrial process features (peculiarities)
- the dose assessment for the refinery workers involved in activities in areas with anomalous TENORM presence
- the chemical and radiometric characterization of typical residues and wastes containing TENORM which had been found during the surveys performed on the plants, such as sludge, etc.

As regards hot points determination, the three following treatment sections have been individuated so far:

- Sludge treatment area
- Desalters
- Cocking heaters

In analogy with upstream results, the samples collected from the sludge treatment area and inside the cocking serpentine showed anomalous concentrations, in comparison with background levels, of Ra-226 and Pb-210.